

Mexican data for November, 1897.

| Stations. | Altitude. | Mean barometer. | Temperature. | | | Relative humidity. | Precipitation. | Prevailing direction. | |
|----------------------------|-----------|-----------------|--------------|------|-------|--------------------|----------------|-----------------------|--------|
| | | | Max. | Min. | Mean. | | | Wind. | Cloud. |
| | Feet. | Inch. | ° F. | ° F. | ° F. | % | Inch. | | |
| Artega (Coahuila)... | 5,414 | 28.28 | 86.7 | 32.0 | 63.0 | 0.28 | T. | | |
| Barousse (Coahuila)... | 1,656 | 28.28 | 79.7 | 48.2 | 62.2 | 0.05 | ws. | sw. | |
| Colima (Sem.)... | 6,241 | 24.10 | 85.1 | 28.4 | 60.6 | 0.98 | sw. | sw. | |
| Durango... | 5,934 | 24.36 | 79.5 | 34.9 | 61.2 | 0.05 | s. | | |
| Leon... | 4,948 | 29.99 | 95.0 | 59.7 | 75.9 | 4.05 | ne. | n. | |
| Magdalena (Sonora)... | 50 | 29.12 | 73.8 | 39.2 | 57.7 | 0.30 | nw. | ne. | |
| Merida (Yucatan)... | 7,472 | 28.34 | 91.4 | 41.0 | 66.4 | 0.32 | e. | se. | |
| Mexico (Obs. Cent.)... | 6,401 | 24.02 | 78.8 | 41.7 | 61.5 | 0.13 | ssw | w. | |
| Monterey... | 1,626 | 25.12 | 84.2 | 40.6 | 66.2 | 0.32 | nw. | ne. | |
| Morelia (Seminario)... | 5,164 | 25.12 | 84.2 | 40.6 | 66.2 | 0.32 | ne. | | |
| Oaxaca... | 7,112 | 23.39 | 79.5 | 31.1 | 63.0 | 0.43 | ne. | | |
| Puebla (Col. Cat.)... | 6,070 | 24.25 | 78.4 | 37.9 | 61.3 | 0.03 | e. | | |
| Queretaro... | 5,399 | 24.93 | 81.0 | 41.5 | 61.2 | 0.08 | sw. | n. | |
| Saltillo (Col. S. Juan)... | 6,202 | 24.21 | 75.6 | 41.5 | 59.2 | 0.07 | ne. | se. | |
| San Luis Potosi... | 6,063 | 24.35 | 74.3 | 46.4 | 63.3 | 0.01 | ene. | sw. | |
| Silao (Guanajuato)... | 8,612 | 22.00 | | | | 1.07 | | ese. | |
| Toluca (Mexico)... | 8,720 | | 83.1 | 50.2 | 63.1 | 0.00 | | | |
| Torreón (Coahuila)... | 1,864 | 28.17 | 92.8 | 54.7 | 75.0 | 0.04 | nw. | nnw. | |
| Tuxtla (Chiapas)... | | | 85.3 | 32.0 | 59.7 | 0.16 | | | |
| Vaqueria (Coahuila)... | 8,015 | 22.58 | 77.0 | 39.0 | 58.8 | 0.54 | e. | e. | |
| Zacatecas... | 5,078 | 24.99 | 81.7 | 47.1 | 67.6 | 0.29 | se. | sw. | |
| Zapotlan (Jalisco)... | | | | | | | | | |

BRIGHT METEOR.

By H. A. HAZEN.

On November 3, 1897, at 21:15 (9:15 p. m.) eastern standard time, a very brilliant meteor (nearly half the apparent diameter of the moon) was seen in Washington, D. C., due west from the corner of Massachusetts avenue and Tenth street NW. Its course was vertically downward for about 12°, disappearing at 15° above the horizon. The path at first was narrow, then came a series of dashes, followed by a continuous streak, constantly increasing in brilliancy till it flashed out extremely bright and whitish, when it instantly disappeared. The point of greatest brightness and disappearance formed the lowest apex of an almost equilateral triangle with Vega, Alpha Lyrae, and Altair, Alpha Aquilæ, though a little nearer the latter.

MILTON G. RENOE.

Milton G. Renoe was born at Manassas, Va., and was educated at Brentsville Academy near Manassas and subsequently at the University of Virginia at Charlottesville. Before entering the Weather Service he was a teacher in the public schools. He enlisted in the Signal Service (now Weather Bureau) on May 23, 1889; was promoted to 1st class private June 10, 1890; in July, 1891, he (with others) was transferred to the position of Observer, Weather Bureau, by virtue of the act transferring the Weather Service from the War Department to the Department of Agriculture. Shortly after July, 1896, he was again promoted and assigned to duty as official in charge of the station at Cheyenne, Wyo., as well as Director of the Wyoming Section of the Climate and Crop Service. Prior to his assignment as official in charge at Cheyenne, he had served as assistant at the following named stations: Baltimore, Albany, Savannah, and Philadelphia. He was an especially careful and painstaking person, and during his connection with the service was five times commended for accuracy in his meteorological work. He died at Cheyenne on the evening of December 16, 1897, at the age of 35. His services in the Weather Bureau distinguished him as a highly valued employee.

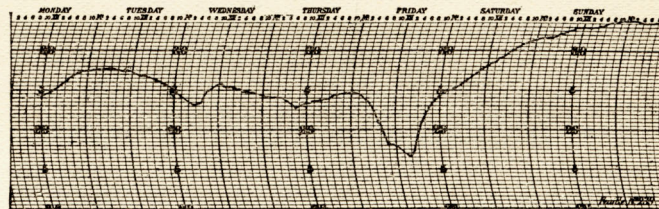
A WINTER BAROGRAPH CURVE FROM THE SOUTH PACIFIC OCEAN.

By ROBERT DE C. WARD (dated Harvard College Observatory, Southern Station, Arequipa, Peru, S. A., October 1, 1897).

Barograph curves from the southern oceans are comparatively so rare that they possess a considerable degree of interest under any circumstances. That interest naturally

increases if the record represents the pressure conditions registered during a particularly stormy period, and which are remarkable by reason of their sudden changes or other peculiarities. The accompanying plate is a reproduction of a barograph curve obtained during a winter voyage recently made by the writer through the Strait of Magellan and up the west coast of South America as far as Corral, Chile (latitude 39° 52' S.; longitude 73° 17' W.). The instrument, a small sized Richard Freres barograph, was hung by a spiral spring from the ceiling of the stateroom, and was prevented from excessive swinging during rough weather by three cords tied to the handle of the instrument and made fast to hooks fixed at convenient distance in the walls. This method of swinging the barograph was found to answer very well, and a continuous series of excellent curves was obtained on the writer's whole voyage from New York to Peru, by way of Rio de Janeiro, Montevideo, the Falkland Islands, and the Strait of Magellan.

The sheet here reproduced was put on the barograph at noon on Monday, August 2, 1897, when the steamer (the *Luxor*, of the Kosmos Line) was in the Strait of Magellan about 20 miles east of Punta Arenas, and it was removed at 8.15 a. m. on Monday, August 9, when the ship was at anchor in the harbor of Corral. The greater part of the week was exceptionally stormy and the pressure curve is so striking that the writer has thought it might interest the readers of the MONTHLY WEATHER REVIEW to see a reproduction of it.



Tracing from the Richard barograph for the week from Monday, noon, August 2, to Monday, 8 a. m., August 9, 1897, on the steamship *Luxor*, between Punta Arenas and Corral, Chili.

The following record of the weather experienced during the week in question, although unfortunately very incomplete as regards instrumental data, may be sufficiently full to enable those who care to do so to examine the barograph trace intelligently.

Monday, August 2.—The morning was stormy, with frequent snow and rain squalls, wind west-northwest, the velocity reaching 35 miles an hour during some of the squalls. At 8.30 a. m. the temperature was 38° and the sky was nearly overcast with nimbus clouds. About noon (temperature 42.1°, clouds strato-cumulus, $\frac{5}{10}$) the wind changed to the south, with a velocity of 45 miles, and the sky cleared rapidly. The barometer, it will be noted, rose during the afternoon and evening, and until about 5 a. m. on August 3. The wind died down toward sunset, and the early part of the evening was clear and calm. At 10.15 p. m. the ship left Punta Arenas for the west, the weather being fine and the wind southwest, force 3.

(It should be noted that the irregularity in the pressure curve shortly after 9 p. m. was due to an accidental jarring of the instrument.)

Tuesday, August 3.—At 4 a. m. the wind was west, force 3, and it blew steadily from west-northwest, force 4 to 7, from shortly after 4 a. m. until about 4 p. m. The force increased during the day, and after 3 p. m. was between 7 and 9. Frequent rain or snow squalls continued all day and night. At 8 a. m. the temperature was 43.2°; wind velocity 25 miles an hour; clouds, nimbus 10. At noon the temperature was 45°, and the velocity of the wind 30 miles. As the wind was in-

creasing rapidly, and as navigation through the narrow channel of the strait was becoming dangerous, owing to the presence of low fracto-stratus clouds and to the coming on of darkness, the captain decided not to venture out into the Pacific until morning. The ship was therefore anchored at 4:15 p. m. in Sholl Bay, near the western entrance to the strait. The wind blew all night from north-northwest or northwest, force 3 to 10, with frequent heavy rain squalls. The gusts of wind, "williwaws," rushing down from the mountains and over the ship are clearly to be detected on the barograph curve, especially between 6 and 8 p. m., the rapid oscillations of pressure there shown being due to the suction effect of the different gusts. It will be noted that the barograph fell from early on Tuesday morning through the afternoon and night, and shortly after 5 a. m. on Wednesday.

Wednesday, August 4.—From midnight to about 6 a. m. the wind continued to blow from north-northwest, force 3 to 10, with frequent heavy rain squalls. About 6 o'clock it changed to west-southwest, and remained in that quarter until about 1 p. m., the force decreasing from 10 to 6, with continued squalls. As the barometer was rising rapidly after 5 a. m., and especially so after 7:30 a. m., there seemed promise of fine weather; so the anchor was weighed at about 8 a. m. and the ship headed for the Pacific. At 8 a. m. the temperature was 42.0° and the sky was overcast with nimbus. At noon, when off Cape Pillar, the temperature was 43.9° and the velocity of the wind 42 miles an hour, the sky being still overcast and the sea very rough. Occasional breaks in the lower clouds shortly after noon showed blue sky above, and there seemed chances of clearing weather. Between 1 and 4 p. m. the wind increased in velocity somewhat, the force being between 7 and 8 and the direction west to west-northwest, continuing so till 4 a. m. of August 5. At 4 p. m. the velocity was 45 miles an hour, the temperature 43.0°, squally, with blue sky at intervals. The change in wind direction to west at 1 p. m. was coincident with a renewed fall of the barometer, as seen on the curve, which continued through the night and until 9 a. m. on Thursday.

Thursday, August 5.—Until 4 a. m. the wind continued west-northwest, force 8, with frequent rain squalls, and from 4 to 8 a. m. it was northwest, force 8, the barometer showing an increased rapidity of fall after 5.45 a. m. until 9 o'clock, when the pressure began to rise. The wind was northwest or west-northwest the rest of the day, the force decreasing toward night from force 6 to 8 to force 3 to 6. Heavy rain squalls continued during the whole of the twenty-four hours.

Friday, August 6.—The barograph curve between midnight on Thursday and midnight on Friday is especially interesting. The fall began about midnight on Thursday and continued very rapid until about 10 a. m. Friday, when it decreased somewhat, reaching the lowest reading, 28.68 inches, shortly before 4 a. m., after which the pressure rose very rapidly for about ten hours, and then more slowly, the rise continuing during the remainder of the week. The fall amounted in eight hours to 0.65 inch, and the total fall, in fourteen hours, to between 0.75 inch and 0.80 inch. The rise was, in the first ten hours, 0.80 inch, and in forty-two hours 1.60 inch. From midnight to 3 a. m. the wind was west-northwest; at 3 it changed to north-northwest, force 5, and continued veering till it reached east by north, force 3 to 5, and, later, force 5 to 7. From 8 to 9:30 it was east by north. At 9:30 the wind changed to east-northeast, force 7, with sky overcast and heavy rain. At 10:25 the wind fell calm, and then, at 10:40, suddenly blew from northwest, force 3. The clouds broke away somewhat during the calm, but the sky clouded up rapidly again with the northwest wind. During the calm the upper clouds (alto-cumulus) were seen coming from the northwest. The wind continued northwest, force 2 to 5, until about 3 p. m. At noon the temperature was 50.5°, and the sky was $\frac{1}{2}$ covered with alto-cumulus above and fracto-nimbus below. After 3 p. m. the wind be-

came light and variable, and at 3:30 it blew from the south, force 1. At 4 p. m., when the barometer showed its sudden rise, the wind increased very rapidly in velocity, until, by 4:30, it had reached storm force (11), with a very high and confused sea. At 8 p. m. it was south-southwest, and about midnight changed to west-southwest, decreasing in force from 8 to 6, but with continued heavy squalls.

Saturday, August 7.—During the early morning there were frequent squalls, accompanied by hail, with the wind west-southwest to southwest all day and night, but the force of the wind steadily decreased. At noon the temperature was 45.4°; the clouds were cumulo-nimbus, from northwest, $\frac{5}{8}$, and clearing. At 4 p. m. the wind velocity was only 12 miles; the temperature was 47.0°; and the clouds were cumulo-nimbus, $\frac{1}{4}$.

Sunday, August 8.—The weather was squally, with rain in the morning; wind west-southwest and south-southwest; force 1 to 2, but in the afternoon it cleared off and a deep blue sky, with scattered cumulus clouds and bright sunshine, was a most welcome relief after the dark and stormy weather of the four preceding days. At 11 p. m. the steamer anchored in the harbor of Corral, two days overdue from Punta Arenas. The next morning it was learned that the two preceding steamers from the south had both encountered very bad weather, with stormwinds and high seas, one of them having arrived at Corral three days late. The master of the *Luxor* stated that he had experienced no passage as bad as this one during his eighteen years of service on the west coast of South America.

The writer is indebted to Captain Behrmann, of the steamer *Luxor*, for extracts from the log of the steamer concerning meteorological observations made by his officers during the night. The wind force, as taken from the log, is given according to the Beaufort scale. The wind velocities, in miles per hour, were obtained by the writer with his Dines's Patent Pressure Portable Anemometer. The barograph was set to the ship's barometer, which had recently been adjusted in port. It is probable the error was not over 0.05 inch.

AN IMPROVED SUNSHINE RECORDER.

By D. T. MARINE, Instrument Division, U. S. Weather Bureau (dated December 17, 1897).

The radiant energy of the sun produces several different effects at the surface of the earth, viz, *light, heat, and chemical changes*. To obtain records of these effects from hour to hour and day to day, as is done of other atmospheric phenomena, and thus obtain the total work done by sunshine, has been a most difficult problem for meteorologists, and one that has not yet been successfully solved. Automatic instruments have been devised for securing approximate records of the intensity and duration of each of these effects separately, but nothing has yet been perfected that will accurately indicate simultaneously the varying intensity of two effects such as the heat and light received from the sun.

Probably the first automatic sunshine recorder ever invented was that described in 1838 by Mr. Thomas B. Jordan, a mathematical and philosophical instrument maker, and Secretary to the Royal Cornwall Polytechnic Society, Falmouth, England.¹ This was developed in connection with Mr. Jordan's efforts to produce a uniform and automatic system of self-registration for the various meteorological instruments then in use in that country, especially the mercurial barometer. For a record chart he used a paper covered with chloride of silver, which had about that time (1838) been discovered to be sensitive to the action of light, and to take different tints in proportion to the intensity of the light to which it was

¹See the Sixth Annual Report of the Royal Cornwall Polytechnic Society, 1838, p. 184.